



Fig. A-F.— A. *Troides amphrysus andrewei* Parrott, n. subsp., ♂; B. Same, ♀; C. *Troides helena orientis* Parrott, n. subsp., ♂; D. Same, ♀; E. *Trogonoptera brookiana haugumei* Parrott, n. subsp., ♂; F. Same, ♀.

NEW BORNEO (KALIMANTAN) SUBSPECIES OF *TROIDES* AND *TROGONOPTERA* (LEPIDOPTERA: PAPILIONIDAE)

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ABSTRACT.— Three new subspecies of birdwings are described from Borneo, Kalimantan, Indonesia: *Troides amphrysus andrewei* n. subsp., *Troides helena orientis* n. subsp., and *Trogonoptera brookiana haugumei* n. subsp.

KEY WORDS: birdwings, Indonesia, Malaysia, *Ornithoptera*, Sabah, Sarawak, Sumatra, *Trogonoptera brookiana haugumei* n. subsp., *Troides amphrysus andrewei* n. subsp., *Troides helena orientis* n. subsp.

Birdwing populations of *Troides amphrysus flavicollis* Druce, *Troides helena mosychlus* Fruhstorfer, and *Trogonoptera brookiana brookiana* Wallace, have been described from northern Borneo. Specimens received from Indonesian Borneo (Kalimantan) are different enough to warrant naming as distinct subspecies.

Troides amphrysus andrewei Parrott, new subsp.

Diagnosis.— Compared with *T. a. flavicollis*, *T. a. chrysomelas* Parrott & Schmid, *T. a. amphrysus*, and *T. a. joanae* Parrott, the costal streak, vein stripes, and cell patch are larger and clearer in outline in the new subspecies, with additional white prominent scaling on the streaks and stripes, and the yellow vein stripes are long, narrow, and are not clear in outline.

Description.— **HOLOTYPE MALE.**— *Forewing*: 78mm long, 39mm wide; wingshape triangular; termen angle is 110°; termen slightly concave (as is typical for all *T. amphrysus*); anal margin curved inward (similar to *T. a. joanae*, while in other subspecies the anal margin is more nearly straight); background color black, with lemon-yellow ray-pattern not well defined; a small prominent yellow patch within apex of cell; costal streak ranging in line from cell to apex; vein stripes above and below the veins are yellow and heavily overlaid with dark scales; venter background color black, with a yellow and white pattern; vein stripes are long, narrow in shape, yellow and white in color; submarginal patches are dominantly white with some yellow scaling, except for one submarginal yellow patch in space 1; two cell patches are smaller in size compared to other subspecies.

Hindwing: 40mm long; short, broad, almost round in outline; dorsal color is yellow with black veins (compared to *T. a. flavicollis*, less rounded and longer in length in specimens of equal wingspan); black marginal border is narrow, with black indentations into the yellow area (being smaller to those in subspecies *T. a. flavicollis*); black indentations small in size, and in space 1 black indentations are longer, narrower in shape than in all other subspecies; hair brush along anal edge is dark brown (compared with dark grey in *T. a. joanae*), and light brown in all other subspecies); venter is similar to dorsum, with one minor difference being the smaller size of the black indentation.

Abdomen: yellow except for the dorsal surface which is black on the 1st segment, light brown on the 2nd-5th segments, and yellow on the



Fig. 1. Map of Borneo.

remainder.

Genitalia (Fig. 7, right clasper and harpe): cavity of clasper slightly concave (color is medium brown); clasper shape irregular, longer than its height and with one large terminal tooth; one large dorsal hook which is long, pointed and curves inwards into the cavity space (brown in color); one pointed basal lobe and one small tooth on the dorsal flat part of the harpe. The genitalia (Fig. 8) of one paratype ♂ from southern Kalimantan having the terminal tooth longer and curving ventrally.

ALLOTYPE FEMALE.— *Forewing*: 85mm long, 45mm wide; wingshape is short in length, broad in width, with straight anal margin, rounded tornus, with termen angle approximately 100° and almost straight and apex rounded; pale pattern is whitish, with submarginal vein-stripes and cell patch heavily overlaid with greyish scales; submarginal markings small (shorter than in *T. a. flavicollis*, *T. a. chrysomelas*, and *T. a. perintis*), and with less scale overlay; background color dark brown;



Fig. 2-3. *Troides amphrysus andrewi*, n. subsp.: 2. Holotype ♂ (dorsum); 3. Holotype ♂ (venter).

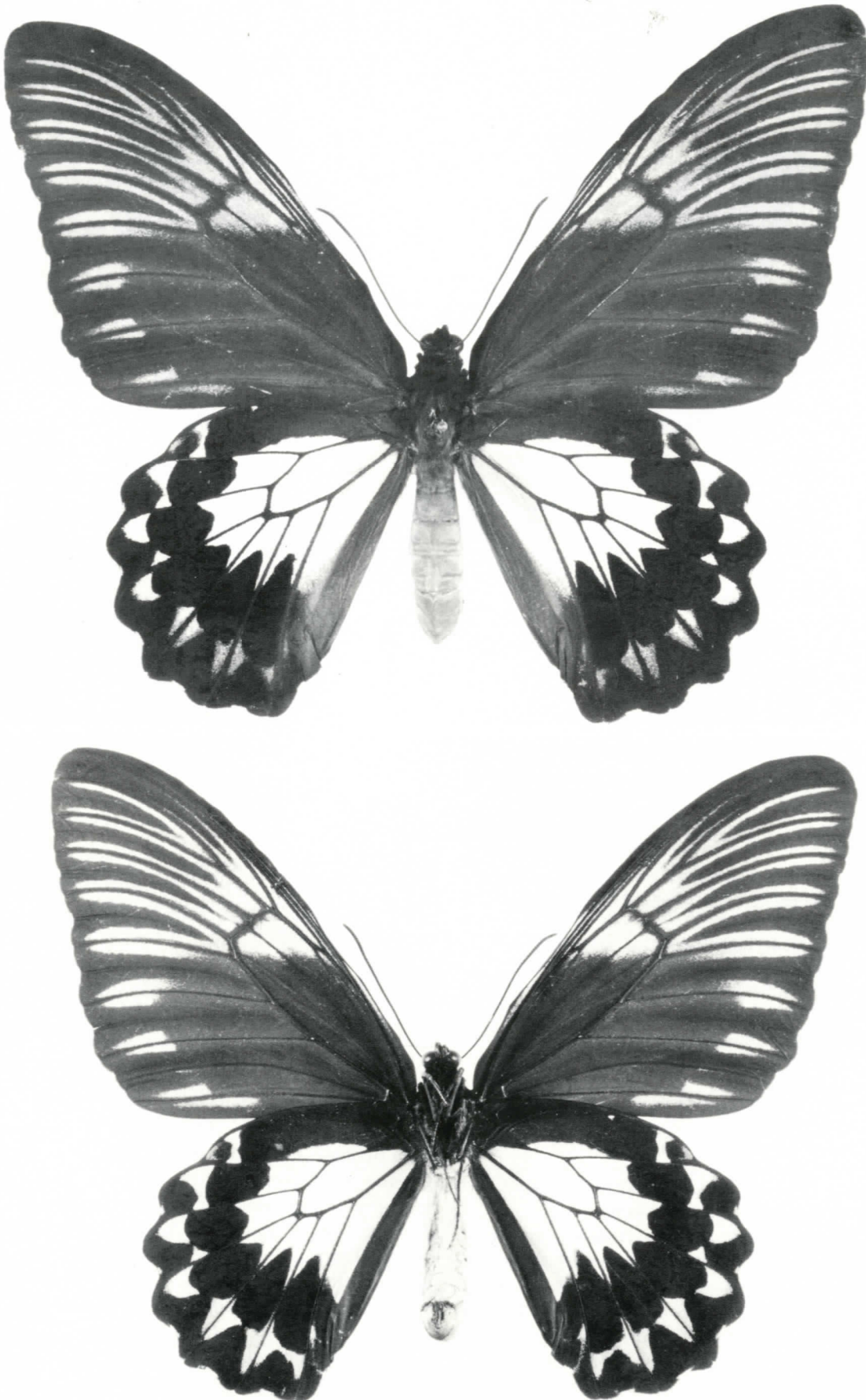


Fig. 4-5. *Troides amphrysus andrewei*, n. subsp.: 4. Allotype ♀ (dorsum); 5. Allotype ♀ (venter).



Fig. 6. *Troides amphrysus andrewi*, n. subsp.: paratype ♂, South Kalimantan.

venter similar to dorsum, with background color dark brown but the pale pattern is larger and creamy colored; submarginal markings above and below vein 1 are light yellow.

Hindwing: 46mm long; short, broad, and quite round in outline; a complete series of black discal spots (smaller than in *T. a. flavicollis*) are fused together, and in space 1-4 the discal spots are connected to outer margin, leaving only small irregular shaped yellow marks submarginally and with the discal area yellow; space 1A is dominantly yellow with some cream color and lightly dusted with brown scales; a long, narrow yellow area is present in center of space 7, above the cell; venter similar to dorsum, with yellow portions larger.

Abdomen: dorsum is brown; venter and sides are yellow.

Holotype ♂ (Fig. 2).— Bontang, East Kalimantan, Indonesia, Jan 1988 (Parrott Coll.). **Allotype** ♀ (Fig. 4): same.

Paratypes (8♂, 10♀).— Same data, 2♂, 5♀. Also 4♂, same data, Feb 1990. Two additional male paratypes: Southeast Kalimantan, Oct 1983, 1♂ (Fig. 6), and East Kalimantan, Jan 1988, 1♂, differ from the holotype: the forewing cell has no yellow cell patch and the vein stripes are clearer in outline than the holotype.

Also 2 paratype ♀ (same data) and 1 paratype ♀ (same data, May 1990), and 1 paratype ♀, South Kalimantan, Indonesia, Oct 1983: in these 4 females the cell patch in the forewing is smaller in size compared to the allotype. Another paratype ♀ (same data as allotype) has some differences: hindwing space 7 has the

yellow area above the cell longer, higher and covering approximately half the surface area of the space.

All the type material is in the Parrott Collection, Port Hope, Ontario, Canada.

Etymology.— This subspecies is named in memory of Dr. Andrew M. Low, for his extensive study of *Ornithoptera* throughout his life and his contribution to the *Monograph of Birdwing Butterflies*, by Haugum and Low (1983).

Remarks.— In 1983, I received a male and female *T. amphrysus* labelled Kalimantan, Indonesia, which I believed represented a new subspecies, and in 1988 a series of specimens were taken from Bontang, East Kalimantan, followed in 1990 with a further 2 males and 2 females. After careful examination of all these specimens, I concluded that they represented a new subspecies of *T. amphrysus*. Bontang, East Kalimantan, is situated on the east coast of Borneo (Fig. 1). Bontang appears to be a new geographical extension for this species. Little has been published on *T. a. amphrysus* from Kalimantan, South Borneo. Color illustrations of a male and female by Ohya (1983: pl. 91), under the name of *T. amphrysus flavicollis* and also from Kalimantan, appear to be similar to new subspecies, *T. a. andrewi*.

In addition to maculation differences noted above for the subspecies similar to *T. a. andrewi*, the forewing shape being triangular with a termen angle of the males of about 110° is

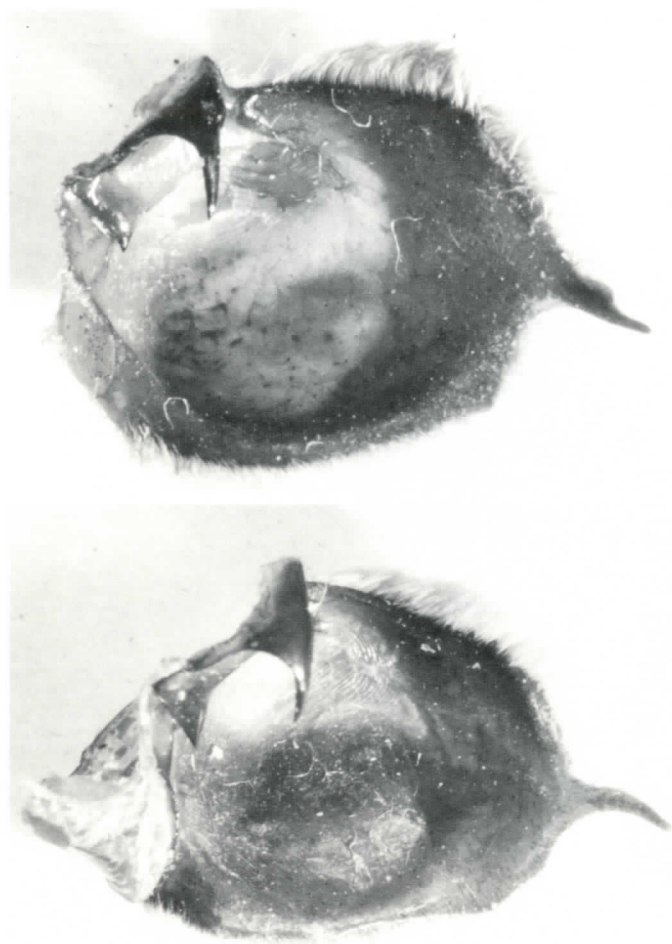


Fig. 7-8. *Troides amphrysus andrewewi*, n. subsp., ♂ harpe and clasper: 7. Holotype; 8. Paratype (South Kalimantan).

different, compared to *T. a. joanae* and *T. a. chrysomelas* at 110° , *T. a. flavicollis* at about 105° , and nominate *T. a. amphrysus* at 102° . In the female the termen angle of about 100° differs from *T. a. flavicollis*, at about 105° , and all other subspecies, at about 110° . The female maculation of a dark brown background color is similar to *T. a. ruficollis* (form *euthydemus*), from West Sumatra, as compared to the typical *T. a. flavicollis* females with light brown. One female specimen from Segu, Sarawak, Borneo, is lighter brown (Tsukada and Nishiyama, 1982: pl. 4, fig. 4). Female hindwing differences, compared to females of *T. a. flavicollis*, are as follows: the discal yellow area always seems to be smaller; in space 7 the yellow area is higher and black discal spots are longer; the marginal white spots are wider in width and broader in height. The *T. a. andrewewi* females also all have a dark red neck collar, while *T. a. flavicollis* neck collars may be whitish, yellow, light orange, but rarely is red. I have examined 18 females of *T. a. flavicollis* from several different localities: Keningau, Ranau, Sandakan (Poring), Mt. Kinabalu (Sabah), Segu, and Sarawak.

Comparative Material.—Subspecies studied include:

Troides amphrysus ruficollis (Butler): Cameron Highlands, West Malaysia (12♂, 7♀), Parrott Coll. Published color illustrations: Cameron Highlands, West Malaysia (1♂, 1♀) (Tsukada and Nishiyama, 1982: pl. 3, fig. 2, 4; pl. 4, fig. 3-4); Malay Peninsula (1♂, 1♀) (D'Abrera, 1976: 167).

Troides amphrysus flavicollis (Druce): Borneo (1♂, 1♀), Parrott Coll.; Borneo (2♂), Royal Ontario Museum, Toronto. Photos examined: Keningaw, N. Borneo (16♂, 6♀); N. Borneo (1♂); Busan, Borneo (1♂); Sandakan, Borneo (1♂); all Allyn Museum, Sarasota, FL. Published color illustrations: Sabah, Borneo (1♀) (Haugum and Low, 1983: pl. 6, fig. 4); Ranau, North Borneo (1♂, 1♀), and Keningaw, N. Borneo (2♀) (Tsukada and Nishiyama, 1982: pl. 5, fig. 1-4); Borneo (2♂, 1♀) (D'Abrera, 1976: 163).

Troides amphrysus ruficollis (form *euthydemus*) (Fruhstorfer): Sumatra, Indonesia (23♂, 3♀), Parrott Coll. Published color illustrations: Kalo Hill, N. Sumatra (1♂, 1♀) (Tsukada and Nishiyama, 1982: pl. 3, fig. 1, 3).

Troides amphrysus niasicus (Fruhstorfer): Nias, Indonesia (7♂, 5♀), Parrott Coll. Published color illustrations: Nias (1♂) (Haugum and Low, 1983: pl. 4, fig. 6); Telukdaram, S. Nias (1♀) (Tsukada and Nishiyama, 1982: pl. 4, fig. 1-2); Nias (2♂, 1♀) (D'Abrera, 1976: 164-165).

Troides amphrysus vistara (Fruhstorfer): Published color illustrations: Batu (1♂) (Haugum and Low, 1983: pl. 5, fig. 7); Batu (1♀) (D'Abrera, 1976: 166).

Troides amphrysus amphrysus (Cramer): West Java, Indonesia (18♂, 3♀), Parrott Coll. Published color illustrations: Plamboan Ratoe, Java (1♀) (Haugum and Low, 1983: pl. 6, fig. 1); Mt. Mas, West Java (1♂, 2♀), and Surabaya, East Java (1♂) (Tsukada and Nishiyama, 1982: pl. 6, fig. 1-4); Surabaya, East Java (2♂, 1♀) (D'Abrera, 1976: 161).

***Troides helena orientis* Parrott, new subsp.**

Diagnosis.—This new subspecies is similar to *Troides helena bunguranensis* (Ohya), but differs in having the forewing venter entirely black (pale stripes in *T. h. bunguranensis*) and hindwing black marginal indentations broad. The forewing shape is shorter and broader than other related subspecies, and there are no hindwing white marginal spots.

Description.—**HOLOTYPE MALE.**—Forewing: 68mm long, 34mm wide; wingshape is long and narrow; termen angle is 110° to vein 4, then 105° from vein 4 to apex angle; termen concave (similar to *T. h. bunguranensis*); background color black with pale stripes above veins 6-8, which are not well defined; six long white marginal spots (similar to *T. h. bunguranensis*, but smaller than in *Troides helena mosychlus* (Fruhstorfer)); venter uniformly black without pale stripes.

Hindwing: 32mm long; wingshape triangular (shorter and narrower than other subspecies); surface color yellow with black veins; outer marginal border broad, with black indentations wide, long, and rounded (more than other subspecies); venter similar to dorsum except space 2 with a small black spot.

Abdomen: light yellow except for dorsum which is dark brown on 1st segment, then light brown on remaining segments.

ALLOTYPE FEMALE.—Forewing: 81mm long, 39mm wide; wingshape long and narrow, with an almost straight anal margin, slightly rounded tornus angle and apex; termen angle is 110° , with outer margin straight; background color very dark brown (almost black); a small pale brown mark in apex area of cell; vein stripes by costal streak, with submarginal pale brown patches above and below veins, heavily overlaid with brown scales; submarginal patches shorter in length and appear without sharp borders; venter very dark brown, with pale pattern grayish with some yellow pigmentation, lightly overlaid with dark brown scales; vein stripes and costal streak similar to other subspecies; submarginal patches short and narrow.

Hindwing: 40mm long; wingshape short, narrow and rounded in outline; a complete series of black discal spots connected to black outer marginal border in spaces 1-3; space 4 with square-shaped discal spot



Fig. 9-10. *Troides helena orientis*, n. subsp.: 9. Holotype ♂ (dorsum); 10. Holotype ♂ (venter).

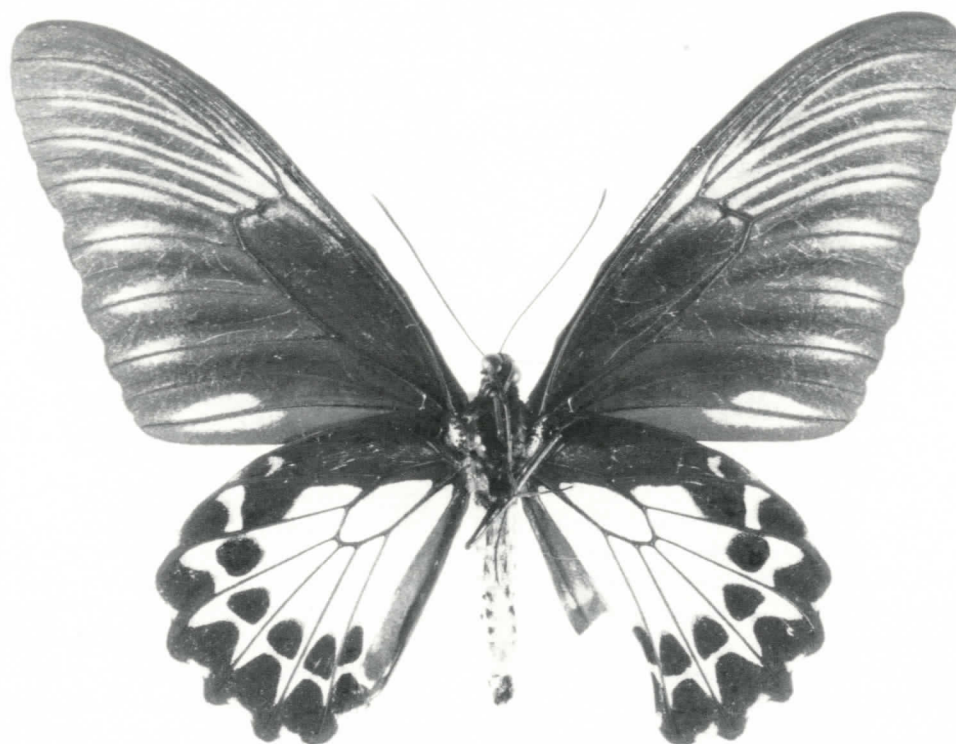


Fig. 11-12. *Troides helena orientis*, n. subsp.: 11. Allotype ♀ (dorsum); 12. Allotype ♀ (venter).



Fig. 13. *Troides helena orientis*, n. subsp.: paratype ♀.

connected to vein 5, and a large and long irregular shaped discal spot in space 5; hindwing color predominantly yellow, with black veins; venter lighter yellow than dorsum, with all discal spots and anal spot not connected to black outer marginal border; marginal spots white.

Abdomen: dorsum dark brown; laterally and ventrally yellow.

Holotype ♂ (Fig. 9-10).— Bontang, East Kalimantan, Indonesia, Dec 1988 (Parrott Coll.). **Allotype** ♀ (Fig. 11-12): same locality, Jan 1988.

Paratypes (1♀) (Fig. 13).— South Kalimantan, Indonesia, 1983. All type material is in the Parrott Collection, Port Hope, Ontario, Canada.

Remarks.— Compared to other subspecies of *Troides helena* (Linnaeus), the new subspecies differs as follows: the forewing outer margin is concave (like in *T. h. bunguranensis*, not straight as in *T. h. mosychlus*, *T. h. helena*, *T. h. nereides* (Fruhstorfer), or *T. h.* form *antileuca* (Rothschild); the forewing venter is black, differing from the pale stripes of *T. h. mosychlus*, and *T. h. bunguranensis*, although in rare cases *T. h. hephaestus* (Felder) and *T. h. helena* may also be without pale stripes; the hindwing is also shorter in the new subspecies (about 2mm less than in *T. h. mosychlus* and *T. h. bunguranensis* of comparable wingspread); the hindwing black marginal indentations are longer and wider than related subspecies; the abdomen dorsum differs in its light brown color, which is dark brown in other subspecies. In the female the submarginal forewing pale markings are pale brown

in color, while they are cream colored and distinct in *T. h. mosychlus*, and light brown with pinkish-gray scales in *T. h. bunguranensis*; the hindwing submarginal patches are short and narrow compared to females of *T. h. mosychlus* and *T. h. bunguranensis*; females of *T. h. helena* have the stripes, streaks, and patches larger and clearer in outline; the female hindwing is smaller in the new subspecies (about 3mm less than other subspecies of comparable wingspread); the hindwing dorsal discal black spots are only as in *T. h.* form *antileuca* (Haugum and Low, 1983: 271, fig. 315); hindwing marginal spots are white, compared to light yellow over intrusive black in other subspecies; and the abdomen dorsal coloring is lighter than in other subspecies.

Comparative Material.— Subspecies studied:

Troides helena mosychlus (Fruhstorfer): Borneo (2♂, 2♀), Parrott Coll. Photographs examined: Borneo (1♂, 1♀); Tenom, N. Borneo (7♂), and Keningaw, N. Borneo (10♂, 5♀), Allyn Museum, Sarasota, FL. Published color illustrations: Keningaw, N. Borneo (1♂), and Ranau, N. Borneo (1♀) (Tsukada and Nishiyama, 1982: pl. 23, fig. 1-2); Borneo (2♂, 1♀) (D'Abbrera, 1976: 117).

Troides helena (form *antileuca*) (Rothschild): Published color illustrations: Kangean, Indonesia (1♂, 1♀) (Haugum and Low, 1983: 271, fig. 314-315).

Troides helena bunguranensis (Ohya): Natuna Is., Indonesia (13♂, 7♀), Parrott Coll.; Natuna Is. (1♂, 1♀), Deslisle Coll. (St. Raymond, Quebec). Published color illustrations: Natuna (1♂, 1♀) (Ohya, 1982: 2).

Troides helena nereides (Fruhstorfer): Bawean, Indonesia (100♂, 30♀), Parrott Coll.

Troides helena hephaestus (Felder): Sulawesi, Indonesia (60♂, 25♀), Parrott Coll.

T. helena helena (Linnaeus): Java, Indonesia (60♂, 25♀), Parrott Coll. Published color illustrations: Java and S. Sumatra, Indonesia (2♂, 1♀) (D'Abrera, 1976: 205); Malang, E. Java (1♂), Kurui, S. Sumatra (1♂), Mt. Mas, W. Java (6♂, 4♀), Mt. Gebe, W. Java (1♀), Garut (3♂, 3♀), and Surabaya, E. Java (1♂, 1♀) (Tsukada and Nishiyama, 1982: pl. 18, fig. 1-12; pl. 19, fig. 1-19).

Trogonoptera brookiana haugumei Parrott, new subsp.

Diagnosis.— This subspecies differs from others in the shorter length of the forewing green markings (except for *T. b. jikoi* (Kobayashi)), and the termen angle is 115°, compared to 120° in other subspecies. Females have a forewing termen angle of 120°, compared to the 118° average of other subspecies.

Description.— HOLOTYPE MALE. — *Forewing* (Fig. 14): 78mm long, 33mm wide; wingshape long, narrow, with termen angle about 120° to vein 3, then about 115°; apex angle rounded and slightly convex with costal angle; background color black with brilliant metallic-green pattern typical for species but with pattern more golden green color; green markings beside veins 1-7 wedge-shaped; venter background color black, with 9 iridescent narrow greenish markings, dusted with blue distally; base of space 1 with a long, narrow, brilliant purplish-blue area which radiates distally into the greenish marking.

Hindwing: 32mm long; shorter than other subspecies (by 2mm); outer margin less wavy than other subspecies' dorsal background color black, with green iridescent scaling on discal areas; venter with row of white markings smaller in size than other subspecies.

Genitalia (Fig. 21): cavity of clasper deeply concave (dark brown); dorsal projection long and pointed; apex of harpe outer rim heavily toothed; apex of harpe apical rim rough.

ALLOTYPE FEMALE. — *Forewing* (Fig. 16-17): 83mm long, 35mm wide; wingshape long, narrow, with termen angle straight and 120°; background color dark brown; iridescent green markings of irregular shape, with marking in anal area long, and markings in spaces 1-4 longer than in other subspecies (color vivid green compared to dull yellowish-green in other subspecies); subapical 4 v-shaped markings white but not well defined and heavily overlaid with brown scales; venter brown, with an iridescent green and blue pattern; cell with light dusting of green and blue scales; submarginal white stripes shorter and narrower than other subspecies.

Hindwing: 34mm long; shape shorter, more rounded and distal margin less wavy than other subspecies; background color dark brown; lower half of cell iridescent green and dorsal spaces 1-6 with rays of green scaling radiating towards discal; white submarginal pattern indistinct; blue iridescence in half of cell; venter dark brown, with white markings smaller than in other subspecies.

Holotype ♂ (Fig. 14-15). — Bontang, East Kalimantan, Indonesia, Dec 1988 (Parrott Coll.). **Allotype** ♀ (Fig. 16-17): same.

Paratypes (17♂, 5♀). — Same data, 8♂, 1♀; Same, May 1990, 5♂, 3♀. Also 4♂ paratypes (same data, 1♂, and 1990, 3♂) with wedge-shaped green markings larger on forewing than in holotype. Also 1♀ paratype (same data) with white maculation on hindwing larger than in allotype. All type material is in the Parrott Coll., Port Hope, Ontario.

Etymology.— I name this subspecies in honor of a special friend, Jan Haugum, for his extensive study of birdwings in order to give

a better understanding through scientific research, and for his contribution to *Lepidoptera Group 68*, *Papilio International*, and the *Monograph of Birdwing Butterflies* (Haugum and Low).

Remarks.— In this new subspecies the green forewing markings are shorter in length than in other subspecies, except for *T. b. jikoi* Kobayashi which has the shortest markings of any subspecies. In females the new subspecies also is more dark brown on the forewings compared to the pale brown of *T. b. brookiana* (Wallace), while *T. b. trogon* (Snellen), *T. b. natunensis* (Rothschild), *T. b. cardinaali* Haugum and Low, and *T. b. jikoi* are dark brown, and *T. b. albescens* (Rothschild) is light brown. The female forewings also have the white markings indistinct and overlaid with brown scales, which in other subspecies are clearly defined and without brown scales. The female forewing venter has the white maculation similar to *T. b. trogon* and *T. b. jikoi*, while in *T. b. brookiana* the white maculation is much larger. The female hindwings have the submarginal pattern hazy, compared to *T. b. brookiana* where they usually are larger and clearer white.

Tsukada and Nishiyama (1982: 236, pl. 32, fig. 5) and Igarashi (1979: pl. 75, fig. 5) illustrate females from Borneo that are similar to the new subspecies.

Comparative Material.— Specimens compared:

Trogonoptera brookiana brookiana (Wallace): Sabah (1♂, 1♀), Parrott Coll. Published color illustrations: Borneo (1♀) (Haugum and Low, 1982: p. 65, fig. 38); Sabah (1♂) (*ibid*, 88, pl. 1, fig. 1), 1♀ (*ibid*, 89, pl. 2, fig. 1).

Trogonoptera brookiana trogon (Snellen): Sumatra, Indonesia (50♂, 10♀), Parrott Coll. Published color illustrations: Sumatra (1♂, 1♀) (Haugum and Low, 1982: 88-89, pl. 1-2).

Trogonoptera brookiana albescens (Rothschild): Malaysia (100♂, 40♀), Parrott Coll.

Trogonoptera brookiana cardinaali Haugum & Low: Singkep Is., Indonesia (3♂, 6♀), Parrott Coll. Published illustrations: Singkep (1♂, 1♀) (Haugum and Low, 1982: 60-63, fig. 32, 34); Singkep (1♂, 1♀) (Shizenshi, 1986).

Trogonoptera brookiana natunensis (Rothschild): Natuna Is., Indonesia (5♂, 3♀), Parrott Coll.

Trogonoptera brookiana jikoi Kobayashi: Published color illustrations: Tuangku Is., Indonesia (2♂, 2♀) (Shizenshi, 1986).

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Fig. 14-15. *Trogonoptera brookiana haugumei*, n. subsp.: 14. Holotype ♂ (dorsum); 15. Holotype ♂ (venter).



Fig. 16-17. *Trogonoptera brookiana haugumei*, n. subsp.: 16. Allotype ♀ (dorsum); 17. Allotype ♀ (venter).



Fig. 18-19. *Trogonoptera brookiana haugumei*, n. subsp.: 18. Paratype ♂ (dorsum); 19. Paratype ♂ (venter).

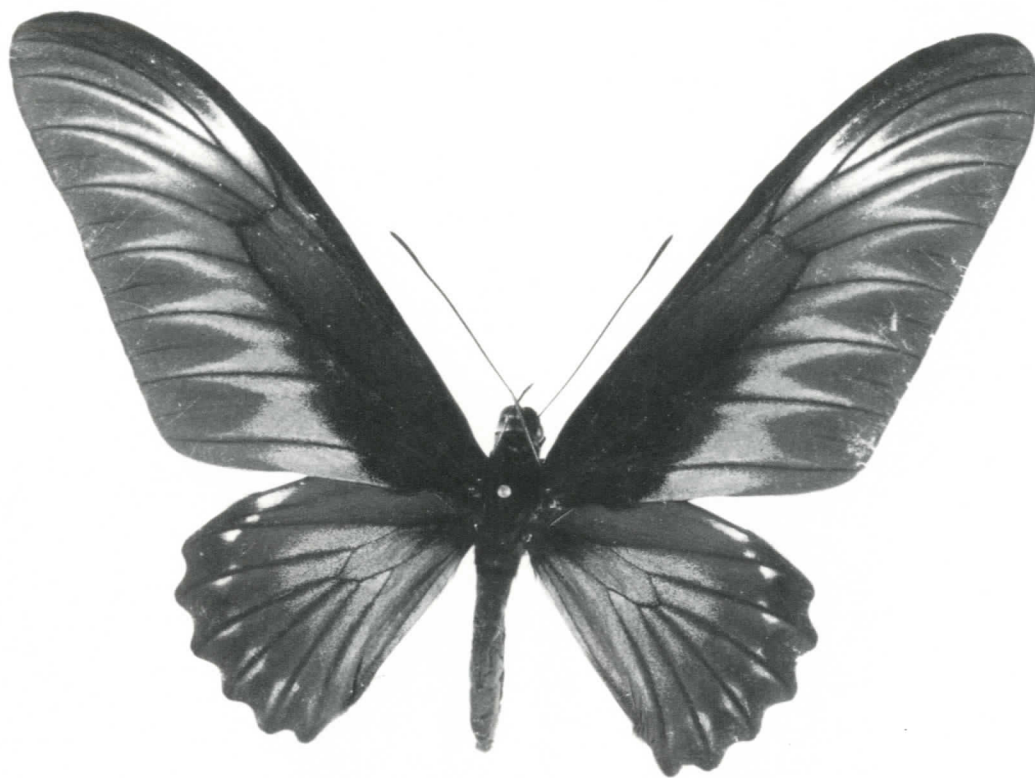


Fig. 20-21. *Trogonoptera brookiana haugumei*, n. subsp.: 20. Paratype ♀ (dorsum); 21. Paratype ♀ (venter).



Fig. 22. *Trogonoptera brookiana haugumei*, n. subsp.: paratype ♀ (dorsum).

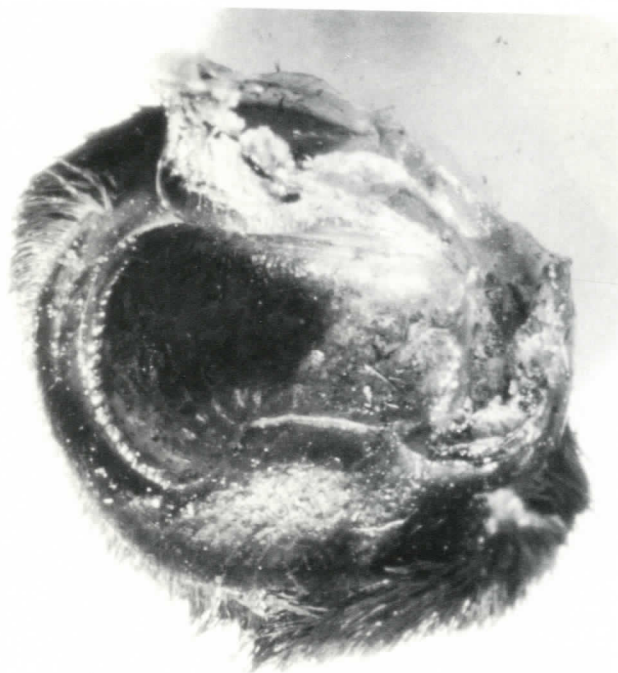


Fig. 23. *Trogonoptera brookiana haugumei*, n. subsp.: paratype ♂, right harpe and clasper.

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